USAFOEHL REPORT

87-063EQ0031EEF

WASTEWATER CHARACTERIZATION AND HAZARDOUS WASTE SURVEY, CASTLE AFB CA

ROBERT D. BINOVI, LT COL, USAF, BSC
ROBERT A. TETLA, 1LT, USAF, BSC
CHARLES W. ATTEBERY, 2LT, USAF, BSC

May 1987

Final Report

USAF Occupational and Environmental Health Laboratory
Human Systems Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

ADA182481

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY NA	3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution is unlimited; approved for public release
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE NA	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAFOEHL Report 87-063EC0031EEF	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION USAF Occupational and Environmental Health Laboratory 6b. OFFICE SYMBOL (If applicable) ECQ	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Brooks AFB TX 78235-5501	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Same as 6a 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code) Same as 6a	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
Wastewater Characterization and Hazardous Waste Survey, Castle AFB CA

12. PERSONAL AUTHOR(S) Charles W. Attebery, 2Lt, USAF, BSC; Robert A. Tetla, 1Lt, USAF, BSC; Robert D. Binovi, Lt Col, USAF, BSC

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM 22 Sep TO 27 Sep 86	May 1987	45

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Wastewater; Hazardous Waste; Waste management; Sewage Treatment; Castle AFB CA

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The USAFOEHL conducted a survey evaluating the industrial wastewater system and hazardous waste program at Castle AFB. The scope of the survey was to: (1) analyze the sewage treatment plant spray field effluent and base surface water drainage ditch influent and effluent for NPDES parameters; (2) evaluate oil/water separators, sumps, oil holding tanks, fire training area, oil recovery unit, and the industrial treatment system for characteristic hazardous waste; and (3) evaluate hazardous waste management practices and opportunities for waste minimization.

Results of the survey showed: (1) The spray irrigation system works well. Water entering the drainage ditch prior to Canal Creek contains relatively low concentrations of NPDES parameters. (2) Three separators and two sumps were found to contain

(over)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL Robert A. Tetla, 1Lt, USAF, BSC	22b. TELEPHONE (Include Area Code) (512) 536-3305
	22c. OFFICE SYMBOL ECQ

DD Form 1473, JUN 86 Previous editions are obsolete. SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

Item 19 Continued

characteristic hazardous waste. (3) The base has virtually no baseline chemical analysis to characterize waste streams, consequently, most waste streams are classified hazardous waste without documented rationale. (4) Opportunities exist to reduce quantities of waste in the following categories: rinsewater, solvents, sewage treatment and acids.

Recommendations: (1) Clean out the separators located on the north side of building 175, the west side of building 325, near building 1509, and the sumps located near buildings 79 and 1260. Wastes from these locations should be disposed of as hazardous waste. Furthermore, these locations should be periodically inspected and monitored. (2) Develop a comprehensive waste analysis plan and hazardous waste training and educational program. (3) Procure a small solvent recovery unit for waste MEK for the 93 FMS Corrosion Control Paint shop. (4) Reevaluate the service requirements for each Safety Kleen unit to ensure the base is not paying for the disposal of "clean" solvent. (5) Sample Industrial Waste Treatment effluent for 40 CFR 261, Appendix IX selected parameters. (6) Resample sludge and include moisture content as a test parameter. (7) Sample sludges from oil/water separators, sumps, and holdings, and analyze for hazardous waste characteristics. (8) Resample drainage ditch influent and effluent, and aeration pond effluent for volatile hydrocarbons, bacteria (fecal streptococci and fecal coliform), and radioactivity.

CONTENTS

ILLUSTRATIONS

I. INTRODUCTION

On 2 May 86, 93 CSG/DEEV, Environmental Planning Office, Castle AFB, requested USAF Occupational and Environmental Health Laboratory (USAFOEHL) to perform a wastewater characterization and hazardous waste survey. The data from the survey are required for the base's National Pollutant Discharge Elimination System (NPDES) application and Resources Conservation Recovery Act (RCRA) Part B application.

The objectives of the survey were to analyze the surface water quality entering and leaving the base for NPDES contaminants and to perform a characteristic hazardous waste evaluation on wastewater collected at 31 sample sites. The NPDES sample sites were identified by the Regional Water Control Board while 26 initial hazardous waste sample sites were determined by EPA Region 9. Two sampling sites were evaluated for NPDES parameters (see Table 1); another site was planned to be evaluated for NPDES parameters but was found to be dry. During the survey, one of the original EPA identified hazardous waste sample sites (building 65: oil/water separator) was found to be no longer in use and five additional sampling sites were identified. Also, the base Bioenvironmental Engineer requested that an oil/water separator located on the fighter squadron flight line (Site 16) be included for hazardous waste analysis. Therefore, a total of 31 sampling sites were evaluated for characteristic hazardous waste (see Table 2). Furthermore, a hazardous waste survey was performed to evaluate the base hazardous waste program. Recommendations and conclusions were based on comparisons between the survey results and the Safe Drinking Water Act standards for wastewater and Resource Conservation and Recovery Act (RCRA) for hazardous waste.

The wastewater survey was conducted by Lt Col Robert D. Binovi, 2Lt Charles W. Attebery, 2Lt Michael R. Spakowicz, TSgt Ben Hernandez, and A1C Roberto Rolon. The hazardous waste survey was conducted by Major Elliot K. Ng and 1Lt Robert A. Tetla. The survey was performed from 22-27 Sep 86.

II. BACKGROUND

A. Introduction

Castle AFB (CAFB), the home of the 93rd Bombardment Wing, is located near the center of the State of California in the San Joaquin Valley. The base is in the northeastern portion of Merced county and is approximately 8 miles north of the city of Merced. The base serves as an Air Force training center for B-52 G/H and KC-135 crews. The base population during the survey was approximately 5451 (5037 military and 414 nonmilitary).

Merced county has a semiarid climate, characterized by hot summers, mild winters, moderate precipitation and infrequent snow.

The annual mean maximum temperature is 74°F and the annual mean minimum temperature is 49.4°F. The mean maximum temperature of the hottest month, July, is 95°F. During the survey the average high and low temperatures were 69 and 53°F, respectively; and the precipitation totaled .18 inches.

Table 1: NPDES Discharge Parameters

Parameters

Fecal Streptocci Bacteria
Fecal Coliform Bacteria
Total Organic Carbon
Total Solids
Total Dissolved Solids
Ammonia
Kjeldahl Nitrogen
Nitrate
Nitrite
Phosphorus

Bromide
Chloride
Cyanide
Fluoride
Sulfide
Aluminum
Antimony
Arsenic
Beryllium
Barium
Boron
Cadmium
Cobalt
Chromium
Copper
Iron
Lead
Manganese
Mercury
Molybdenum
Nickel
Selenium
Silver
Thallium
Titanium
Tin
Zinc
Phenols
Surfactants
Oil & Grease
Radioactivity: gross alpha & gross beta

Pesticides to include:
- Diazinon
- Malathion
- Baygon
- Fican

Parameters

Volatile Hydrocarbons to include:
- Bromodichloromethane
- Bromoform
- Bromomethane
- Carbon Tetrachloride
- Chlorobenzene
- Chloroethane
- 2-Chloroethylvinyl ether
- Chloroform
- Chloromethane
- Dibromochloromethane
- 1,2-Dichlorobenzene
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- Dichlorofluoromethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethene
- Trans 1,2-Dichloroethene
- 1,2-Dichloropropane
- cis 1,3-Dichloropropene
- Trans 1,3-Dichloropropene
- Methylene Chloride
- 1,1,2,2-Tetrachloroethane
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- Trichlorethylene
- Trichlorofluoromethane
- Vinyl Chloride
- Benzene
- Ethylbenzene
- Toluene

Table 2: Characteristic Hazardous Waste Parameters[1]

Parameter Tests:

Corrosivity: (tests for pH greater than or equal to 12.5 and less than or equal to 2.0)

Ignitability: (tests for flammability at less than 140°F)

Reactivity : (tests for CN and S)

EP Toxicity: (tests for metals As, Ba, Cd, Cr, Pb, Hg, Ag, and Se)

B. Wastewater Treatment System

Industrial operations stem from facility, aircraft and vehicle maintenance. As shown in Figure 1, industrial wastewater typically flows through an oil/water separator, into the sanitary sewer to the base sewage treatment plant. An industrial sewer system transports wastewater from buildings 59, 79, 1260, and 1544 to the industrial waste treatment plant, collocated at the sewage treatment plant. The industrial wastewater treatment plant presently consists of an oil/water separator and settling tank (Shown in the bottom picture of Figure 2). Treated water discharges into the outlet of the chlorine contact chamber of the sewage treatment plant.

Wastewater from oil/water separators at buildings 65, 88, 175, 325, 1260, 1325, 1335, and 1552 discharges into the sanitary sewer system and is transported to the sewage treatment plant. The sewage treatment plant is designed to treat 1 MGD of raw waste, consists of two trickling filters, three separators, three aeration ponds, chlorination contact chamber and a spray field. Effluent from the aeration ponds is pumped directly to the spray field (see Figures 1 and 2).

C. Surface Water

Runoff from the base, drains through a series of ditches and canals with one base exit, a drainage ditch into Canal Creek (Site 2). There are no major surface water inlets to the base, except possibly from a pond located off-base near the main runway. The pond outfall was dry at the time of the survey. The base obtains all of its drinking water requirements from underground wells.

D. Hazardous Waste

The hazardous waste program is managed by the Environmental Planning Office, 93 CSG/DEEV. Ten accumulation point managers monitor hazardous wastes at the shop level. The Defense Reutilization Management Office (DRMO) is responsible for finding disposal contractors to remove the hazardous wastes from the base.

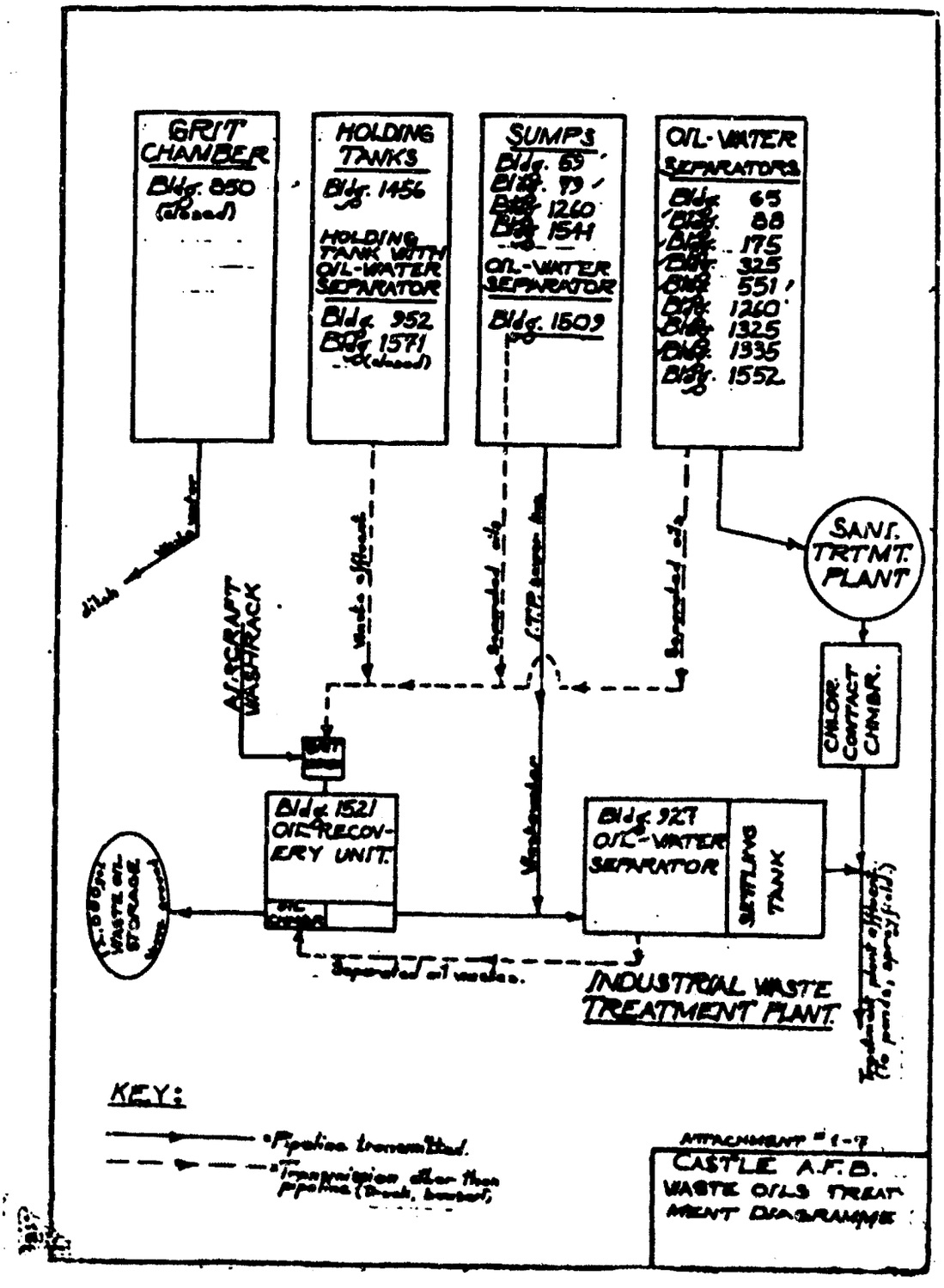

Figure 1. Castle Treatment System

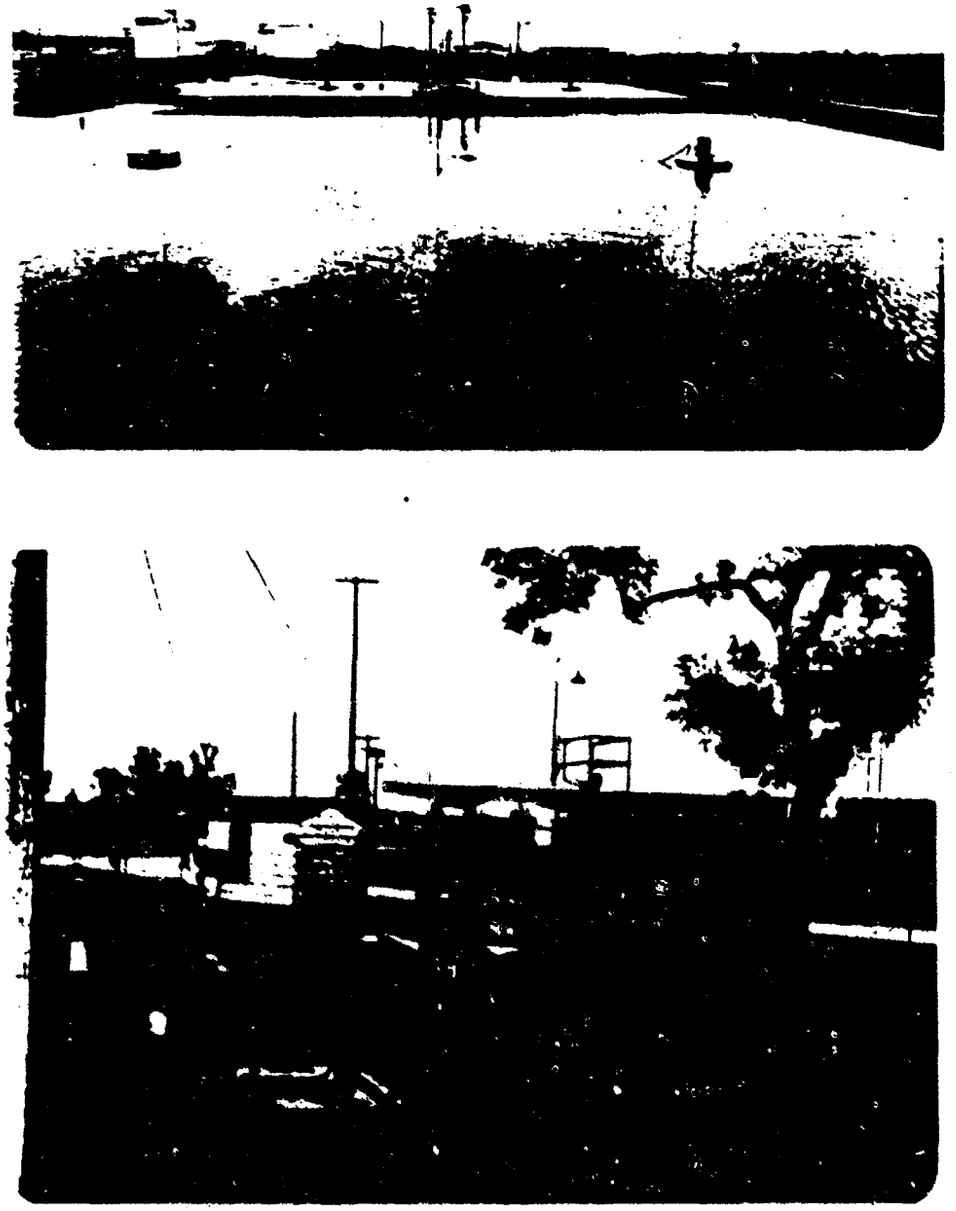

Figure 2. Aeration Ponds and Sewage Treatment Plant

E. Castle AFB Wastewater Discharge Limitations

Castle AFB had a NPDES permit to discharge sewage treatment plant effluent into Canal Creek until 1977 when the effluent point was changed to a spray field. In view of the possibility of having to discontinue using the spray field, the base is investigating resuming discharge into Canal Creek. The results from this survey are to be used to establish a new set of base discharge requirements. NPDES parameters required to be monitored for are listed in Table 1.

F. Characteristic Hazardous Waste Parameters

Characteristic hazardous waste parameters were monitored to address the RCRA Part B application. The characteristic hazardous waste parameters are listed in Table 2.

III. PROCEDURES

A. Wastewater Survey

1. Sampling

a. Site numbers and locations.

A list of site numbers and locations are presented in Table 3.

Table 3: Sample Site Identification

Site	Description
NPDES Sample Sites	
1	Spray Field
2	At confluence o two drainage ditches discharging to Canal Creek (southern corner of the base) taken before the inverted siphon and subsequent discharge to Canal Creek
Hazardous Waste Samples	
	Oil/Water Separators:
3	Building 88 - Vehicle Maintenance Washrack
4	Building 88 - Truck Washrack
5	Building 175 - Weapon System Training Facility (north side)
6	Building 175 - Weapon System Training Facility (south side)
7	Building 325 - Vehicle General Purpose Maintenance (west side, services building)
8	Building 325 - Vehicle General Purpose Maintenance (north side, services building)
9	Building 325 - Vehicle General Purpose Maintenance (northwest side, washrack)

Table 3 Cont'd

Site	Description
10	Building 551 - Automotive Hobby Shop Washrack (behind building 554)
11	Building 1260 - Jet Engine Shop
12	Building 1325 - AGE Washrack
13	Building 1335 - Avionics Maintenance
14	Building 1509 - Flight Line Separator
15	Building 1552 - Fighter Squadron Washrack
16	Building 1572 - Fighter Squadron Flight Line
33	Fire Training Area 3 (o/w separator)
	Holding Tanks with Oil/Water Separators:
17	Building 952 - Engine Test Cell
	Holding Tanks:
18	Building 1456 - Flight Line Holding Tank
	Sumps:
19	Building 59 - Refueling Maintenance
20	Building 79 - Fuel Facility
21	Building 508 - Fuel Facility
22	Building 1260 - Jet Engine Shop
23	Building 1541 - Fuel Cell
	Oil Recovery Vent:
24	Building 1521 - Oil Recovery Unit
	Industrial Treatment:
25	Building 927 - Secondary Separator
26	Building 929 - Tertiary Separator
	Sewage Treatment:
27	Aeration Pond 1
28	Aeration Pond 2
29	Aeration Pond 3
30	Sludge Drying Bed 1
31	Sludge Drying Bed 2
32	Sludge Drying Bed 3

b. Sampling Frequency

Equiproportional composite samples were taken hourly for 24 hours at the spray field pumps (Site 1) and at the base effluent to Canal Creek (Site 2). These two samples were analyzed for the NPDES parameters listed in Table 1. The sampling was accomplished using ISCO Model 2100

Automatic Wastewater Composite Samplers. Grab samples were taken at all other sampling sites. Since the purpose of the grab samples was to determine if hazardous waste is present, samples were taken from oil/water separators by filling the sample containers with a mixed sample from portions of the aqueous and oil phases if oil is present. The grab samples were analyzed for the hazardous waste parameters listed in Table 2. Table 4 presents the analysis and sample preservation methods.

Table 4: Analysis and Preservation Methods for Sites

Analysis	Preservation	Method	Where	Who
Nonfilterable Residue	none	A160.2	on-site	USAFOEHL
Filterable Residue	none	A160.1	on-site	USAFOEHL
pH	none	A423	on-site	USAFOEHL
Temperature	none	E170.1	on-site	USAFOEHL
Ammonia-Nitrogen	H_2SO_4	E350.1	contract lab	UBTL
Nitrates-Nitrites	H_2SO_4	E353.2	contract lab	UBTL
Total Kjeldahl Nitrogen	H_2SO_4	E351.2	contract lab	UBTL
Total Organic Carbon (TOC)	H_2SO_4	E415.2	contract lab	UBTL
Total Organic Halogen (TOX)	none	E450.1	contract lab	UBTL
Cyanide	NaOH	E335.3	contract lab	UBTL
ICP Metals Screen As, B, Cd, Ca, Cr, Co, Fe, Pb, Mg, Mn, Ni, La, Mg, Se, Zn, Ag, Al, Ba, Be	HNO_3	E200.7	contract lab	UBTL
Mercury	HNO_3	E245.1	contract lab	UBTL
Chlorides	none	E325.1	contract lab	UBTL
Sulfate	none	E375.2	contract lab	UBTL
Sulfides	$Zn(C_2H_3O_2)_2$	E376.2	contract lab	UBTL
Total Extract. Phenols	H_2SO_4	E420.2	contract lab	UBTL

Table 4 Cont'd

Analysis	Preservation	Method	Where	Who
Oils and Grease, Total Recoverable	H_2SO_4	E413.1	contract lab	UBTL
Petroleum Hydrocarbons	H_2SO_4	E418.1	contract lab	UBTL
Organochlorine Pesticides and PCBs	none	E608	contract lab	UBTL
Volatile Organics	H_2SO_4	E624	contract lab	UBTL
Base/Neutral/Acid Extractables	none	E625	contract lab	UBTL
Characteristic Hazardous Waste (ignitability, Corrosivity, EP toxicity, Reactivity)	none		contract lab	UBTL

Notes: A indicates Standard Methods for the Evaluation of Water and Wastewater.[2]

E indicates EPA Methods for Chemical Analysis of Water And Wastes.[3]
*UBTL is Utah Biomedical Test Laboratories, Salt Lake City, Utah

B. Hazardous Waste Survey

A comprehensive survey was conducted evaluating the hazardous waste program. During the survey chemical usage was recorded by shop personnel.

The major categories of waste generated at Castle AFB were determined using waste quantities extracted from the Draft Hazardous Waste Material Management Plan, 5 Oct 1986, CAFB, Annex A (see Appendix A). Twelve categories of waste were established and are listed in Table 5 along with the annual forecasted quantity for each category. Over 15% of the wastes generated at Castle AFB are waste fuels. Uncontaminated waste fuels are recovered and reused while contaminated waste fuels are burned in the fire training pit.

Upon deletion of waste fuels, the relative quantities of the remaining waste categories (2-16) were calculated. The results are in Table 5, Column 5, and reveal that over 79% of the remaining wastes are rinsewater, thinners, solvents, fluids and acids, (categories 2, 3, 4, 5, & 6).

After the preliminary waste quantity assessment, the survey team visited the major industrial shops on Castle AFB to observe the industrial activities and to discuss industrial waste disposal practices with shop personnel.

Table 5: Annual Forecasted Waste From Castle AFB

Category	Product	Amount (drums/yr)	% Total Categories 1-12	% Total Categories 2-12
1	Waste Fuels	40	15.04	
2	Waste Rinsewater	55	20.67	24.34
3	Waste Thinners	38	14.28	16.81
4	Waste Solvents	38	12.78	15.04
5	Waste Fluids	28	10.53	12.39
6	Waste Acid	24	9.03	10.62
7	Waste Oil & Oily Rags	15	5.64	6.64
8	NDI Wastes	12	4.51	5.31
9	Waste Carbon Remover	9	3.39	3.98
10	Waste Stripper	6	2.35	2.66
11	Waste Asphalt Products	5	1.88	2.21
12	Waste Filters	2	----	----
TOTALS:		266*	100.00	100.00

* Total excluding category 12

A description of the industrial activities and waste management practice of the shops surveyed is included in the Results and Discussion section.

IV. RESULTS AND DISCUSSION

A. Wastewater Survey

1. NPDES Parameters

The results of testing for NPDES parameters at Sites 1 and 2 along with the recommended Safe Drinking Water Act[4] maximum concentrations are listed in Appendix B.

a. Bacteriological Samples

(1) California requires effluent from treatment facilities to meet certain minimum bacteriological requirements. The requirement for total fecal coliform is generally 23 colonies per 100 ml sample, as stated by the California Regional Water Control Board.[5]

(2) The drainage ditch (Site 2) was analyzed for both fecal streptocci and fecal coliform bacteria. This analysis yielded 10-1000 colonies/100 ml sample fecal streptocci bacteria and 32-3200 colonies/100 ml sample fecal coliform bacteria. (See Appendix B for Results)

b. Inorganic Compounds

(1) The Safe Drinking Water Act recommends maximum concentration levels for inorganic contaminants. These levels are presented along with the results in Appendix B.

(2) The spray field effluent (Site 1) and drainage ditch (Site 2) were analyzed for inorganic parameters. Results of the analysis revealed all concentrations of relevant parameters were below the recommended levels in the Safe Drinking Water Act.

c. Metals

The spray field effluent (Site 1) and drainage ditch effluent (Site 2) were analyzed for metals. Results of this analysis indicate the concentrations of iron and manganese increase between the spray field and Canal Creek. Iron increased from .238 to 1.457 mg/L while manganese increased from <.05 to .19 mg/L. This increase can occur naturally. Both iron and manganese are naturally occurring elements and could be adsorbed by the spray field effluent as it leaches through the soil to the drainage ditch. Metal concentrations at Sites 1 and 2 were below the recommended levels given by the Safe Drinking Water Act.

d. Pesticides

The spray field effluent (Site 1) and drainage ditch (Site 2) were analyzed for pesticides. Results of this analysis showed no pesticide concentrations above the level of detection for the test method.

e. Organics

(1) The Safe Drinking Water Act both regulates and recommends maximum concentrations for organic contaminants. These requirements and recommendations are presented in Appendix A along with the survey results.

(2) The spray field effluent (Site 1) and the drainage ditch (Site 2) samples were analyzed for organic parameters. Results of this analysis showed that most of the parameter concentrations were below the limit of detection for the test method. Chloroform and 1,2-dichloroethane were found in low levels in both the spray field effluent and in the drainage ditch, 6 µg/L and 5.6 µg/L, respectively. 1,2-dichloroethane was found to exceed the Recommended Maximum Contaminant Level (MCL) of 5.0 µg/L and the State of California action level of 1 µg/L.

2. Hazardous Waste Characterization

Results of characteristic (40 CFR 261) hazardous waste analysis for Sites 3 through 33 are presented in Appendix C.

a. Oil/Water Separators

The results indicate the oil/water separators located on the north side of Building 175 (Site 5) and the west side of Building 325 (Site 7) need to be serviced. These separators contain 100% organics. The separator

located on the north side of Building 175 contained 100% jet engine oil. The separator located on the west side of Building 325 contained 100% petroleum oil. Other separators and sumps containing oils or fuels are listed below:

Site	Location	Concentration
6	Building 175 south separator	10% synthetic oil
8	Building 325 north separator	1% oil
14	Building 1509 separator	10% petroleum oil
20	Building 79 fuel facility sump	50% JP-4 fuel
22	Building 1260 jet engine shop sump	1% petroleum distillate

b. Ignitability

One oil/water separator and two sumps contained ignitable materials below 140°F; therefore, the contents contained in these sites are considered hazardous waste. These sites are listed below:

Site	Description	Ignitability
14	Building 1509 oil/water separator	75°F
20	Building 79 sump	75°F
22	Building 1260 sump	130°F

c. Reactivity

Reactivity analysis reveals the concentration of cyanide and sulfide. The concentration of cyanide and sulfide considered hazardous is listed in an interim guidance amendment to RCRA. These values are 250 mg/Kg and 500 mg/Kg, respectively. No sites with reactive hazardous waste were found.

d. Corrosivity

Results of the corrosivity analysis showed all sites contained noncorrosive waste.

e. EP Toxicity

Results of the EP Toxicity (40 CFR 261.24) analysis showed no sample sites exceeded the standard.

B. Hazardous Waste Survey

1. The following are results of a shop-by-shop hazardous waste survey of the major industrial operations at Castle AFB. A summary of waste disposal practices by shop is in Appendix D.

a. 93 TRANS Refueling Maintenance, Building 59

93 TRANS Maintenance personnel perform scheduled and unscheduled maintenance of refueling trucks and hosecarts. Waste fuel and waste oil are stored in bowsers. Waste oil is taken to underground storage tanks located across from the motor pool where it is disposed of by contractor. Contaminated fuel is burned at the fire training pit, while uncontaminated fuel is returned to POL for reuse. A Safety Kleen unit (Figure 3) is used for degreasing parts. This arrangement allows the degreasing solution to be changed and disposed of by the Safety Kleen Corporation. Empty spray cans are disposed of in the trash. The sump outside Building 59 contained .08 mg/L lead and 6 mg/L sulfide.

Figure 3. Safety Kleen Degreasing Unit

b. 93 FMS Fuels Preventive Maintenance, Building 79

93 FMS Fuels Maintenance personnel drain and wash fuel and water trucks. Aircraft soap, residual oils, greases, fuels, and water from the washrack enter a sump outside of Building 79. This sump contained 50% JP4 fuel, .04 mg/L cadmium, .08 mg/L lead and 53 mg/L sulfide. The contents of this separator were found to be an ignitable hazardous waste.

c. Vehicle Washrack, Building 88

This wash area consists of one manual washrack and one automatic washrack. The major discharge from this area is car care soap type II (by Klix Corporation) and water.

d. 93 TRANS Vehicle Maintenance, Building 325

(1) 93 TRANS Vehicle Maintenance complex is comprised of the General Purpose Repair shop, Special Purpose Repair shop, Allied Trades Repair shop, Minor Purpose Repair shop (includes the Battery shop, the Tire Shop and Minor Maintenance shop), Material Control section and a washrack.

(2) The General Purpose Repair shop maintains and repairs government vehicles and their major waste is engine oil. The Special Purpose Repair shop maintains and repairs heavy equipment. Their major wastes are hydraulic, transmission and engine oils. The Allied Trades Repair shop is responsible for auto body work. Their major wastes are thinners, paints and hardeners. The Battery shop turns batteries into DRMO after draining them. The waste acid is neutralized, placed in 55-gallon drums, and disposed of as hazardous waste. Oils and waste antifreeze are collected in a bowser and taken to underground storage tanks. Waste paints and thinners are stored in a 55-gallon drum and disposed of as hazardous waste at the hazardous waste storage facility (HWSF). Aircraft soap (Eldorado Type 1, NSN 6850-00-935-0995) is used to clean floors and heavy vehicles. Three Safety Kleen degreasing units are located in this complex and are serviced monthly. The separator west of Building 325 contained 100% petroleum oil (EP Tox parameters were not analyzed). The north separator contained 1% oil and .05 mg/L cadmium and 13 mg/L sulfide.

e. 93 CSG Auto Hobby Shop, Building 551

The Auto Hobby shop is housed in a "garage type" building containing state-of-the-art equipment for maintenance and repair of privately owned vehicles. A washrack is located behind the shop. This shop has a Safety Kleen carburetor unit, a PD-680 tank (for degreasing parts), a sodium hydroxide tank (to decarbonize engines), and a paint booth. Waste oils are placed in bowsers and taken to the underground storage tanks located across from the motor pool. Waste PD-680 is placed in 55-gallon drums and turned into DRMO. The sodium hydroxide tank has never been emptied. Eldorado Type I aircraft soap is used to clean the floors.

f. BX Service Station, Building 785

The BX Service Station is an automotive garage whose services include dispensing gas and performing minor automotive repair. Waste oils are placed in an underground storage tank and pumped out by a contractor.

g. 93 FMS Test Cell, Building 949

93 FMS Test Cell personnel test and tune jet engines. The major waste from this facility is aircraft cleaning compound (NSN 6850-01-184-3182) that is sprayed directly on the engines and rinsed off. The rinse water drains to a floor drain.

h. Paint Shop, Building 1253

(1) Paint shop personnel strip and paint aircraft parts. There is a cold stripping tank, a hot stripping tank, a rinse water tank, and a soap tank located outside this facility. The hot stripping tank holds 150 gallons of B&B 9201 (NSN 6850-00-F00-2574) stripper, the cold stripping tank holds 75 gallons of MSCI (NSN 8010-00-926-1489) cold stripper. Both tanks are drained every three months, and their contents disposed of as hazardous waste. The contents of the rinse water tank and aircraft soap tank (150 gallons each) are drained every four months and disposed of as hazardous waste.

(2) A paint booth is located inside the building. The painting area in this shop has a down-draft ventilation system that includes an 800 gallon reservoir of water located below the paint area. This system removes paint mists by circulating air over the reservoir. The water is changed out once every quarter and disposed of as hazardous waste. Also, this shop uses approximately 15-30 gallons of methyl ethyl ketone (MEK) per day. MEK is used to clean paint guns and other painting equipment. The waste, approximately 80% pure MEK, is disposed of as hazardous waste.

i. 84 FITS Engine Shop, Building 1260

The 84 FITS Engine shop is responsible for intermediate maintenance of the J-33-A-35 Turbojet. This shop has a Safety Kleen degreasing unit for large parts and a Safety Kleen carbon remover tank (250 gallons). Both the carbon remover and degreasing units are serviced by Safety Kleen Corporation. PD-680 is used to clean filters and waste filters are disposed of as hazardous waste (approximately 5 per week).

j. 93 FMS Jet Engine Interim Maintenance, Building 1260

93 FMS Jet Engine Interim Maintenance is broken into Non-Powered Aerospace Ground Equipment (AGE) maintenance, and B-52 and KC-135 Jet Engine Maintenance sections. The Jet Engine Section personnel perform scheduled maintenance, and complete engine tear downs and rebuildings. The AGE section performs maintenance on non-powered AGE equipment (3000 and 4100 series) and shop equipment. Waste engine oil is stored in a bowser and taken to the underground storage tanks located across from the motor pool. Eldorado Type I aircraft soap (NSN 6850-00-935-0995, mixed 1:20 mixture of soap to water) is used in the steam cleaning unit, located in the non-powered AGE section. Aircraft soap and floor soap are discharged into the floor drain.

Uncontaminated JP-4 is reused. Contaminated fuel is burned in the fire training pit. The sump located outside Building 1260 contained 1% petroleum distillate, .006 mg/L mercury and 13 mg/L sulfide and is an ignitable hazardous waste.

k. 93 FMS Aerospace Ground Equipment (AGE), Building 1325

93 FMS AGE shop is responsible for the inspection, service, repair, and cleaning of flight line support equipment. Empty paint cans are thrown in the trash. Waste aircraft lube oils and antifreeze are taken to the underground storage tanks located across from the motor pool. Waste SAE 30 lube oil is stored in a bowser and transferred into the base gas station underground storage tank. Waste hydraulic fluid is placed in a 55-gallon drum and turned in to the waste manager. B&B 2020 solvent is used for washing AGE equipment at the washrack located next to this building. The only drain in this facility is located at the washrack. The separator located outside Building 1325 contained .09 mg/L cadmium and .36 mg/L lead.

l. 93 FMS Avionics Maintenance, Fire Control Shop, Building 1335

93 FMS Avionics Maintenance shop is responsible for maintenance of B-52 aircraft guns. This shop has recently received a new, hot 1,1,1-trichloroethane tank with a distilling apparatus attached to it. During the survey the new hot tank was not in operation. Wastes generated in this shop include 1,1,1-trichloroethane which is drummed and taken to the HWSF. Waste oil from the hot oil bath is drained once a year, drummed and taken to the HWSF. The separator located outside Building 1335 contained .01 mg/L cadmium.

m. 93 FMS Fuel System Repair, Building 1509

93 FMS Fuel System Repair personnel perform maintenance and repair on B-52 and KC-135 integral fuel tanks (wing mounted), and fuel cells (bladder, fuselage). Leak classification and detection is performed approximately once a month using a variety of dyes and solvents. Sealants and coatings are mixed, handled and stored in this area. The major waste from this shop is JP-4. The fuel is placed in bowsers, sampled, and then disposed. If the fuel is contaminated, it is burned in the fire training pit; if the fuel is uncontaminated, it is turned in to POL and reused. The separator located outside Building 1509 contained 10% petroleum distillate. The contents of this separator were found to be an ignitable hazardous waste.

n. 93 OMS Aircraft Washrack, Building 1521

The OMS washrack personnel are responsible for washing B-52 and KC-135 aircraft. The washrack uses approximately 20-25 gallons of PD-680 and 30-35 gallons of Hotsy soap per aircraft. The rinsewater from the washrack enters an adjacent open pit type oil/water separator. The oil recovery unit located near Building 1521 contained .22 mg/L cadmium, .09 mg/L chromium, .72 mg/L lead, and 8 mg/L sulfide.

o. 84 FITS AGE, Building 1552

84 FITS AGE shop is responsible for inspecting, servicing, repairing and cleaning aerospace ground equipment. A Safety Kleen degreasing unit is used for parts and the unit is serviced monthly. Waste oil is stored in 55-gallon drums and transferred to the underground storage tanks across from the motor pool. Fuel is placed in bowsers, sampled, and then disposed of by either burning (fire training pit) or reuse (turned in to POL). Aircraft soap is used for washing AGE equipment at the washrack. The separator outside Building 1552 contained .01 mg/L cadmium.

p. 84 FITS Fuel System Repair, Building 1543/1541

84 FITS Fuel System Repair branch responsibilities include the removal, replacement and repair of T-33 fuel system components. Negligible waste is generated in this shop. The sump located outside Building 1541 contained .01 mg/L cadmium.

q. 84 FITS Acid Shop, Building 1572

84 FITS Acid shop personnel are responsible for performing etching operations using a mixture of acetic, hydrochloric, nitric and sulfuric acids. All acids from this shop are neutralized with sodium bicarbonate, pumped into a holding tank, and drained at the RV dump station into the sewerage treatment plant. The separator located near Building 1572, which is currently not in use, contained .045 mg/L cadmium, .509 mg/L chromium, .367 mg/L lead, .044 mg/L selenium, and 8 mg/L sulfide.

2. Ten accumulation point managers monitor wastes at the shop-level and are responsible for filling out DD Form 1348 (DoD Single Line Item Release/ Receipt Document); transporting wastes to the HWSF (Buildings 1524 and 1525); and keeping records associated with disposal. The accumulation point manager for the 93 FMS/MAFES Corrosion Control maintains the hazardous waste storage facility. DRMO is responsible for finding a contractor to remove the hazardous waste. Occasionally, the disposal contractor will sample the waste to assure its composition.

V. OBSERVATIONS AND CONCLUSIONS

A. Wastewater survey

1. The spray irrigation system at Castle AFB appears to be working well. The base drainage ditch is relatively free of high concentrations of NPDES parameters.

2. The characteristic hazardous waste analysis conducted on oil/water separators, sumps, holding tanks, and oil recovery units revealed the following:

a. Two of the oil/water separators (Sites 5 and 7) contained 100% organics. Test results agreed with site observations.

b. Sites 14, 20, and 22 contained ignitable hazardous waste. These sites emitted a strong odor and subsequently were found to contained levels of petroleum distillates and JP-4 jet fuel.

c. Waste from all sites was found to be noncorrosive. The pH was between 2.0 and 12.5 for all sites.

d. Waste from all sites was found to be nonreactive. Concentrations of cyanide and sulfide were below 250 and 500 mg/Kg, respectively.

e. The following sites contained hazardous waste:

Site 5 (100% organics)
Site 7 (100% organics)
Site 14 (ignitable)
Site 20 (ignitable)
Site 22 (ignitable)

B. Hazardous Waste Survey

1. Safety Kleen Products

The base uses Safety Kleen products when possible. Safety Kleen Corporation services these degreasing units, i.e., drains the used degreasant and replenishes the units, on a routine schedule. This service relieves the base of purchasing and disposal responsibilities for the degreasant (normally PD-680). Eight of the shops visited during the hazardous waste survey were using Safety Kleen products.

2. Empty Spray Paint cans

Empty spray cans are disposed of in the trash. The base received authorization from both the State of California and the Merced County landfill to dispose of empty spray cans in this manner.

3. Waste Analysis

Castle AFB has virtually no baseline chemical analysis to characterize waste streams. Consequently, most of the waste streams are deemed hazardous waste, even though some waste streams may be nonhazardous. For example, all neutralized battery acid is treated as hazardous waste based on one analysis performed in Dec 1983.

4. Battery Acid

Waste acid from lead acid batteries is neutralized, placed in 55-gallon drums and disposed of as hazardous waste. This practice is based on one analysis taken on 3 Dec 83 of neutralized acid showing 11,120 mg/L of lead.

5. 93 FMS Corrosion Control Paint Shop

a. The 93 FMS Corrosion Control Paint shop uses approximately 15-30 gallons of methyl ethyl ketone (MEK) per day. MEK is used to clean paint guns and equipment. Waste MEK from this shop contains about 20% paint waste and is disposed of as hazardous waste. Waste MEK is drummed in its original five-gallon can before being taken to the HWSF. During pickup the contractor transfers waste MEK from five-gallon cans to 55-gallon drums and disposes both the empty cans and the 55-gallon drums of MEK as hazardous waste. The paint shop is considering purchasing and disposing of MEK in 55-gallon drums in the future to eliminate the burden and cost associated with transferring hazardous waste from small containers into 55-gallon drums.

b. The painting area in this shop has a down draft ventilation system. This system uses water from an 800-gallon reservoir to remove paint mists as air is circulated over the reservoir. The water in the reservoir is drained quarterly and stored in 55-gallon drums before being disposed of as a hazardous waste. Unfortunately, the rationale for this expensive disposal practice is not well documented.

6. Hazardous Waste Training

Many shop personnel are confused about how to get wastes analyzed. For example, the hazardous waste accumulation point manager for accumulation point #6 did not know who to call in order to get a waste stream sampled.

7. Hazardous Waste Management Plan

Base personnel have been trying to get its hazardous waste management plan approved by California for over three years. Judging from the meeting during the survey, between DEEV and California Department of Health Services, Northern California Section, Toxic Substances Control Division, it appears base officials are still a long way off in their attempt to determine what the State officials want.

8. Aircraft Washing

During our visit three aircraft were washed. The aircraft were each washed on different days and approximately 20-25 gallons of PD-680 was used to clean the engine exhaust tracks, landing gear and heavily soiled areas. The rinsewater (soap, PD-680 and water) from aircraft washings enter an oil/water separator located next to the washrack. We did not observe any apparent problems with this operation during our visit.

9. Hazardous Waste Storage Facility

DEEV has recently implemented an inspection program for accumulation sites and the HWSF. The inspector is enthusiastic and supportive of the hazardous waste program. While accompanying the inspector, we noted drums in the HWSF stacked three-high because of delays in procuring a disposal contractor.

VI. RECOMMENDATIONS

A. Wastewater Survey

1. A closed loop system for 1,2-dichloroethane use should be established at the shop level to minimize losses. 1,2-dichloroethane is not removed by the treatment plant.

2. Discontinuation of chlorination processes at the treatment plant should be considered as a way to eliminate chloroform formation in the sewage treatment influent. The appropriate state representative should be contacted to discuss this possibility.

3. Samples from the separators at Sites 5 and 7 were found to contain 100 percent organic chemicals. We recommend these separators be cleaned out and the contents be disposed of as hazardous waste. Waste crankcase oil should not be disposed of through an oil/water separator. These separators are designed to take oil drippings that cannot be caught during normal equipment maintenance procedures. Operations responsible for this dumping should be identified and the practices changed to collect the organic compounds.

4. Sites 14, 20, and 22 contain ignitable hazardous waste. We recommend the separator and sumps be cleaned out and the contents be disposed of as hazardous waste. Large percentages of fuel should not be present in an oil/water separator or sumps. The shop personnel involved should be briefed on hazardous waste management practices to avoid any further occurrence. Sites 5, 7, 14, and 22 should occasionally be inspected and sampled.

5. This survey, like many surveys, generated the need for additional or repeat sampling requirements. The following are recommended follow-on sampling to be performed:

a. Sample drainage ditch influent when flow is occurring for NPDES parameters. Resample drainage ditch leaving the base (Site 2) at the same time.

b. Sample the sludges from oil/water separators, sumps, and holding tanks for characteristic hazardous waste parameters when liquid disposal or cleaning is necessary.

c. Resample the sewage treatment plant digestor sludge since EP characteristic hazardous waste analyses were not completed because of laboratory problems. Determine moisture content of the sludge. Moisture content should be determined on site.

d. Based on the results contained in Appendixes A and D, sample the industrial treatment plant effluent for 40 CFR 261 Appendix VIII parameters, requesting SW-846 "Test Methods of Evaluating Solid Waste Physical and Chemical Methods" procedures. Methods 8010 Volatile Halocarbons and 8020 Aromatic Volatile Hydrocarbons should pretty much include the chemicals found. The USAFOEHL can perform methods 8010, 8020 and 8080, and the metals in-house, other methods must be contracted out, and if required, special arrangements should be made through USAFOEHL/SA.

B. Hazardous Waste Survey

1. The base should reevaluate servicing requirement for each Safety Kleen unit. In general, shop personnel feel Safety Kleen units are an asset despite the costliness. However, several shop personnel commented that cleanout for some units may be too frequent, consequently, for these units the base may be paying for disposal of "clean" solvent.

2. Castle AFB needs to develop a waste analysis plan. This plan should consist of a complete listing of each known waste stream with a description of the process or operation generating the waste, results of a baseline chemical analysis to fully characterize the waste, required frequency of analysis, sampling technique, and the parameters to analyze for (see Figure 4). By using such a sampling program, the base can determine, within reasonable time, rationale for classifying each waste stream as either hazardous or nonhazardous. Unfortunately, most of the waste streams on base are deemed hazardous with little or no documented rationale. For example, the 800 gallon reservoir of water for the paint booth in the 93 FMS Corrosion Control Paint Shop should have a baseline analysis to substantiate the need to drum up 800-gallons of wastewater as a hazardous waste on a quarterly basis (Note: The reservoir was sampled during November 86 and the results indicated the water is not a hazardous waste but the sludge is hazardous. This should reduce the quantity of category 2 waste, i.e., rinse water.)

3. The 93 FMS Corrosion Control Paint Shop should procure a small portable solvent recovery unit for waste MEK. This unit should dramatically cut the disposal cost of solvent, waste category 4. This shop is a good candidate for a solvent recovery unit to reclaim MEK, since 75-150 gallons per week of 80% pure MEK are generated. The unit will reduce the cost of purchasing new MEK and the cost of disposing five-gallon cans as well as spent MEK as hazardous waste. In addition, the distillation unit should save time that the shop spends in transporting five-gallon cans of waste MEK from the accumulation site outside the shop to the HWSF.

4. A comprehensive hazardous waste training and education program, tailored specifically for the base, is necessary. This program should allow accumulation managers to become more responsive and supportive of the hazardous waste program. (Note: A program developed by DEEV, Base Bioenvironmental Engineer, and Environmental Health was given to accumulation point managers, shop NCOICs, and hazardous waste facility managers in early Nov 86.)

SHOP (BUILDING)	DESCRIPTION OF WASTE STREAM	BASELINE ANALYSIS (DATE)	EPA NO.	ANALYSIS FREQUENCY	SAMPING TECHNIQUE	PARAMETERS
AMS/PAINT SHOP (110)	WASTE PAINT FROM PAINT BOOTH	(DEC 84) FP-H (70 F) PH-NH, EP-NH RX-NH	D001	SEMIANNUALLY (EACH DRUM)	COLIWASA	FLASH POINT
TRANS/BATTERY SHOP (20)	NEUTRALIZED BATTERY ACID	(JAN 86) FP-NH, EP-NH PH-NH, RX-NH	NH	ANNUAL SPOT CHECK (EVERY OTHER DRUM)	COLIWASA	LEAD, CADMIUM
CSG/MACHINE SHOP (1549)	RINSEWATER FROM 150 GALLON TANK (WEST SIDE)	(JUN 85) FP-H (120 F) PH-H (1.5) RX-NH, EP-H (CHROMIUM, CADMIUM)	D001 D002 D006 D007	QUARTERLY CLEANOUT	DIPPER	FLASH POINT, pH CHROMIUM, CADMIUM

LEGEND: FP - IGNITABILITY; PH - CORROSIVITY; RX - REACTIVITY; EP - EP TOXICITY;
H - HAZARDOUS; NH - NONHAZARDOUS

FIGURE 4. EXAMPLE OF WASTE ANALYSIS PLAN

5. The base should perform analyses to reconfirm neutralized battery acid is a characteristic hazardous waste. Presently, all neutralized battery acid is disposed of as hazardous waste based on an analysis dated Dec 83. With the costliness of disposing neutralized acid as hazardous waste, the base should proceed with more frequent analyses to determine if some or all the neutralized acid can be disposed of as a solid waste. In fact, depending on initial results, it may be cost-effective to sample every drum of neutralized acid to identify those which can be disposed as nonhazardous waste, helping to reduce waste category 6, acids.

6. The results of the hazardous waste analyses indicate Building 1509 oil/water separator (Site 14), Building 79 sump (Site 20), and Building 1260 sump (Site 22) are treating a characteristic hazardous waste. Therefore, either the 93 FMS Fuel System Repair shop, 93 FMS Fuels Preventive Maintenance and the 84 FITS/93 FMS JEIM shop must minimize the amount of petroleum products entering these units or this separator and sumps must be permitted as hazardous waste treatment units. An option might be to convert these units to holding tanks and dispose of the contents as hazardous waste.

REFERENCES

1. United States Environmental Protection Agency, "Identification and Listing of Hazardous Waste", 40 CFR 261, 1 July 1986.

2. APHA, "Standard Methods for the Examination of Water and Wastewater", 16th Edition, APHA, Washington DC, (1985).

3. USEPA, "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020; March 1983.

4. United States Environmental Protection Agency, "National Primary Drinking Water Regulations", 40 CFR 141, 1 July 1986.

5. "Draft Hazardous Waste Materials Management Plan, Castle Air Force Base, California", Oct 86.

6. Wass, Lonnie, State of California, California Regional Water Quality Control Board, Telephone Conversation, Jan 87.

APPENDIX A

Hazardous Waste Inventory

(This page left blank)

HAZARDOUS WASTE INVENTORY

ACCUMULATION POINT	BLDG #	CONTRIBUTING UNITS	OPERATION	WASTES GENERATED	AMOUNTS
1	325	93 Transportation Squadron	Draining and flushing old batteries, auto maintenance	Battery acid-neutralized Waste lubricating oil Auto transmission fluid	24 dr/yr 10 dr/yr 10 dr/yr
2	1253	93 FMS Corrosion Control Shop	Stripping, treating and repairing aircraft parts and ground equipment	Methyl Ethyl Ketone (MEK) Methylene Chloride Stripper Lacquer Thinner	36 dr/yr 6 dr/yr 1 dr/yr
3	1260	93 FMS Propulsion Branch	Engine cleaning and repair	PD-680 cleaning compound Carbon remover Engine oil	12 dr/yr 4 dr/yr 1 dr/yr
4	1324	93 FMS Aerospace Ground Equipment (AGE)	Equipment and parts cleaning	PD-680 cleaning compound Hydraulic fluid Waste oil	4 dr/yr 4 dr/yr 2 dr/yr
5	1335	93 AMS Fire Control Section	Parts cleaning	PD-680 cleaning compound	4 dr/yr
6	1350	93 FMS Wheel and Tire Shop	Cleaning wheels	PD-680 cleaning compound Carbon remover Hydraulic fluid	12 dr/yr 4 dr/yr 4 dr/yr
7	1532	93 FMS NDI Shop	Engine and parts inspection	1,1,1-Trichlorethane Petroleum Distillate	4 dr/yr 8 dr/yr
8	1952	84 FITS	Aircraft maintenance	PD-680 cleaning compound Carbon remover Oil saturated rags Paint thinner	2 dr/yr 1 dr/yr 2 dr/yr 2 dr/yr
9	1319	93 OMS/MAOG Organizational Maintenance Squadron	Aircraft refueling Engine maintenance Aircraft maintenance	Jet fuel from fuel spills Hydraulic fluid JP-4 pillows	40 dr/yr 10 dr/yr 20 dr/yr
10	1203	93 CSG/DEM BCE Shops	Pavement maintenance Electric systems repair	Asphalt products PCB transformers/regulators	5 dr/yr 60 items

(This page left blank)

APPENDIX B

NPDES Parameter Sampling Results

(This page left blank)

Castle AFB
NPDES PARAMETER SAMPLING RESULTS

Parameter	Safe Drinking Water Act Concentration (mg/L)	Site 1 Concentration (mg/L)	Site 2 Concentration (mg/L)
Fecal Streptocci Bacteria		NR	10-1000
Fecal Coliform Bacteria		NR	3200
Total Organic Carbon		25	16
Total Suspended Solids		NR	105
Total Dissolved Solids		NR	273
Ammonia		8.55	0.60
Kjeldahl Nitrogen		10.90	2.60
Nitrate	10.0	<0.10	<0.10
Nitrite		0.10	<0.02
Phosphorus		5.40	<0.10
Bromide		<0.10	<0.10
Chloride		60	24
Cyanide		<0.01	<0.01
Fluoride		0.36	0.36
Sulfide		NR	<0.10
Aluminum		<0.01	NR
Antimony		<0.01	<0.01
Arsenic	.05	<0.01	<0.01
Beryllium		<0.01	<0.01
Barium	1.0	<0.20	<0.20
Boron		<0.50	<0.50
Cadmium	0.01	<0.01	<0.01
Cobalt		<0.01	NR
Chromium	0.05	<0.05	<0.05
Copper	1.0	0.031	<0.02
Iron	0.3	0.238	1.457
Lead	0.05	<0.02	<0.02
Manganese	0.05	<0.05	0.19
Mercury	.002	<0.001	NR
Molybdenum		<0.01	NR
Nickel		<0.05	<0.05
Selenium	0.01	<0.01	<0.01
Silver	0.05	<0.01	NR
Thallium		<0.01	<0.01
Titanium		<0.05	NR
Tin		<0.01	NR
Zinc	5.0	0.07	0.09
Phenols		<0.01	<0.01
Surfactants		0.20	0.10
Oil & Grease		3.20	<0.30
Radioactivity:			
gross alpha (picocuries/L)	15**	NR	19.1
gross beta (picocuries/L)		NR	<2.5

Parameters	Safe Drinking Water Act Concentration (mg/L)	Site 1 Concentration (mg/L)	*Site 2 Concentration (mg/L)
Pesticides			
Diazinon		ND	ND
Malathion		ND	ND
Baygon			
Fican			
Volatile Hydrocarbons			
Bromodichloromethane	*	ND	ND
Bromoform	*	ND	ND
Bromomethane		ND	ND
Carbon Tetrachloride	(zero)	ND	ND
Chlorobenzene		ND	ND
Chloroethane		ND	ND
2-Chloroethylvinyl ether		ND	ND
Chloroform	*	.0054	.0051
Chloromethane		ND	ND
Dibromochloromethane	*	ND	ND
1,2-Dichlorobenzene		ND	ND
1,3-Dichlorobenzene		ND	ND
1,4-Dichlorobenzene	(.75)	ND	ND
Dichlorofluoromethane		ND	ND
1,1-Dichloroethane		ND	ND
1,2-Dichloroethane	(zero)	.006	.0056
1,1-Dichloroethene	(.007)	ND	ND
trans 1,2-Dichloroethene		ND	ND
1,2-Dichloropropane		ND	ND
cis 1,3-Dichloropropene		ND	ND
trans 1,3-Dichloropropene		ND	ND
Methylene Chloride		ND	ND
1,1,2,2-Tetrachloroethane		ND	ND
Tetrachloroethylene		ND	ND
1,1,1-Trichloroethane	(.20)	ND	ND
1,1,2-Trichloroethane		ND	ND
Trichoroethylene	(zero)	ND	ND
Trichlorofluoromethane		ND	ND
Vinyl Chloride	(zero)	ND	ND
Benzene	(zero)	ND	ND
Ethylbenzene		ND	ND
Toluene		ND	ND

ND - not detected. Less than the detection limit.
NR - not reported because of omission in sampling or analysis.
() - RMCLs, non-enforceable.
* - total of four parameters is .100 mg/L
** - excludes contributions from radon and uranium

APPENDIX C

Hazardous Waste Parameter Sampling Results

(This page left blank)

CASTLE AFB
HAZARDOUS WASTE PARAMETER SAMPLING RESULTS

Site #	EP TOX (mg/L) As	Ba	Cd	Cr	Pb	Hg	Ag	Se	DRGF Ig.	pH Cor.	CN Reac.	S	CLASS
1	NPDES parameters												
2	NPDES parameters												
3	-	-	-	-	-	-	-	-	no	6.0	<.01	<1	NH
4	-	-	-	-	-	-	-	-	no	6.0	<.01	<1	NH
5	100% organics not analyzed										<.01	61	Haz
6	-	-	-	-	-	.015	-	-	no	6.0	<.01	24	NH
7	100% organics not analyzed										<.01	260	Haz
8	-	-	.05	-	-	-	-	-	no	6.0	<.01	13	NH
9	-	-	.038	-	.36	-	-	-	no	5.0	<.01	13	NH
10	-	-	-	-	-	-	-	-	no	6.0	<.01	<1	NH
11	-	-	-	-	-	-	-	-	no	6.0	.07	<1	NH
12	-	-	.09	-	.52	-	-	-	no	6.0	<.01	<1	NH
13	-	-	.01	-	-	-	-	-	no	6.0	<.01	<1	NH
14	-	-	-	-	-	-	-	-	75 F	6.0	<.01	<1	Haz
15	-	-	.01	-	-	-	-	-	no	6.0	<.01	<1	NH
16	-	-	.045	.509	.367	-	-	.044	no	9.0	<.01	8	NH
17	-	-	.01	-	.06	-	-	-	no	8.0	<.01	6	NH
18	-	-	-	-	.10	-	-	-	no	6.0	<.01	6	NH
19	-	-	-	-	.08	-	-	-	no	6.5	<.01	6	NH
20	-	-	.04	-	.08	-	-	-	75 F	6.0	<.01	53	Haz
21	-	-	.047	.931	.324	-	-	.018	no	6.0	<.01	13	NH
22	-	-	-	-	-	.006	-	-	130 F	6.0	<.01	13	Haz
23	-	-	.01	-	-	-	-	-	no	6.0	<.01	8	NH
24	-	-	.22	.09	.72	-	-	-	no	6.0	<.01	8	NH
25	-	-	.18	.06	.18	-	-	-	no	6.0	<.01	8	NH
26	-	-	-	-	.07	.009	-	-	no	6.0	<.01	13	NH
27	-	-	-	-	-	-	-	-	no	6.0	.02	1	NH
28	-	-	-	-	-	-	-	-	no	6.0	.02	5	NH
29	-	-	-	-	-	-	-	-	no	6.0	.01	13	NH
30	Not Analyzed*										<.01	190	-
31	Not Analyzed*										.03	400	NH
32	Not Analyzed*										<.01	5	-
33	-	-	-	.06	-	-	-	-	no	6.0	<.01	19	NH
40 CFR CONC.	5.0	100	1.0	5.0	5.0	0.2	1.0	5.0	140 F	<2.0 >12.5	250	500	

- - not detected. Below the limit of detection.
NH - not hazardous waste.
haz - hazardous waste
* - Not analyzed, apparently caps were screwed on too tightly, methane gas built up, and ruptured the sample containers

(This page left blank)

APPENDIX D

Waste Disposal Practices By shops

(This page left blank)

Waste Disposal Practices By Shop

BLDG #	SHOP	TYPES OF CHEMICALS DISPOSED OF BY SHOP	METHOD
59	93 TRANS Refueling Maintenance	Empty Spray Cans	TID
		Waste Oil	PIB
		Safety Kleen	C
		JP-4	FTP/RU
		AntiFreeze	D
88	Vehicle Washrack	Car Soap	DD
325	93 TRANS Vehicle Maintenance	Waste Oil	PIB
		AntiFreeze	PIB
		Aircraft Soap	DD
		Paint Waste and Thinners	D
		Battery Acid	ND
551	93 CSG Auto Hobby Shop	Waste Oil	D
		Sodium Hydroxide	KIT
		PD-680	D
785	BX Service Station	Waste Oil	UGT
		Cleaning Solvent	UGT
949	93 FMS Test Cell	7808 Lube Oil	CIP
		Cleaning Compound	DD
		Empty Spray Cans	TT
1253	93 Corrosion Control	MEK	5C/D
		Strippers	D
		Aircraft Soap	D
		Water From Paint Booth	D
1260	84 FITS/93 FMS JEIM	Waste Oil	PIB
		Floor Soap	DD
		JP-4	FTP/RU
		A/C Cleaning Compound	DD
		Safety Kleen	C
1325	93 FMS AGE	Empty Paint Cans	TT
		Antifreeze	D
		Waste Oil	PIB
		Hydraulic Fluid	D
		Aircraft Lube Oil	D

Note: See Legend Next Page

BLDG #	SHOP	TYPES OF CHEMICALS DISPOSED OF BY SHOP	METHOD
1335	93 FMS AVIONICS	Trichloroethane	KIT/RU/D
1509	93 FMS Fuel Maint Repair	JP-4	PIB/FTP/RU
		Cleaning Compound	D
		Dyes	CIP
		Phenolphthalein	CIP
		Aluminum Hydroxide	CIP
1521	93 OMS Washrack	Hotsy Soap	DDOW
		PD-680	DDOW
1543	84 FITS Fuel System	Isopropyl Alcohol	SDD
		Phenolphthalein	SDD
		Ammonium Hydroxide	CIP
		Methyl Ethyl Ketone	CIP
1552	84 FITS AGE	Waste Oil	D
		Safety Kleen	C
		Aircraft Soap	DD
		JP-4	FTP/RU
1572	Acid Shop	Various Acids	NDD

CIP - Consumed in Process
D - Drummed
DD - Down Drain
FTP - Fire Training Pit
KIT - Kept in Tank
NDD - Neutralized and Placed Down Drain
DDOW - Down Drain to O/W Separator
5C - Placed in 5 Gallon Containers
ND - Neutralized and Drummed
RDD - Rinsed Down Drain
C - By Contractor
TID - Thrown in Dumpster
SDD - Small Amounts go Down Drain (Less Than 1 Gallon/Year)
SRDD - Sent Through Silver Recovery Unit and Placed Down Drain
RU - Reused
TT - Thrown in Trash
PIB - Placed in Browser
UGT - Underground Tank

Distribution List

	Copies
HQ AFSC/SGPB Andrews AFB DC 20334-5000	1
HQ USAF/SGPA Bolling AFB DC 20332-6188	1
HQ SAC/DE Offutt AFB NE 68113-5001	2
HQ SAC/SGPB Offutt AFB NE 68113-5001	2
AAMRL/TH Wright-Patterson AFB OH 45433-6573	1
USAF Regional Medical Center Wiesbaden/SGPB APO New York 09220-5300	1
OL AD, USAFOEHL APO San Francisco 96274-5000	1
USAFSAM/TSK Brooks AFB TX 78235-5301	1
USAFSAM/EDH Brooks AFB TX 78235-5301	2
Defense Technical Information Center (DTIC) Cameron Station Alexandria VA 22319	2
HQ USAF/LEEV Bolling AFB DC 20330-5000	1
HQ AFESC/RDV Tyndall AFB FL 32403-6001	1
USAF Hospital Castle/SGPB Castle AFB CA 95342-5300	3
93 ABG/DEEV Castle AFB CA 95342-5300	5